Complimentary aspects of Six Sigma and VE

PRESENTATION BY:

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FOR

2009 CSVA CONFERENCE

Ottawa, Canada .

November 23-24, 2009

AGENDA

- VE and Six Sigma methodology
- Six Sigma and VE synergy
- Value creation
  - Strategy
  - System
  - Roadmap
- VE and Six Sigma Integrated Job plan
- Growth model

VALUE ENGINEERING***

Systematic methodology that analyzes the functions of items and systems so that required functions are achieved at the lowest possible life-cycle cost

$$Value = \sum_{i=1}^{n} \frac{(Function)_i}{\sum_{j=1}^{g} (Cost)_j}$$

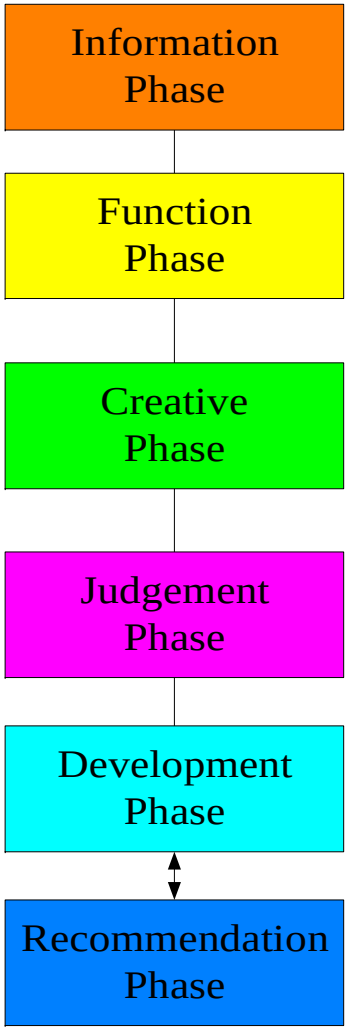
$i = number \quad of \quad Functions$

$j = elements \quad of \quad the \quad Cost \quad associated \quad with \quad each \quad of \quad the \quad Functions$

*** Note: Value Engineering (VE), Value Analysis (VA), Value Management (VM), and Value Planning (VP) names describe small variations in the general Value Method and will be used as synonyms during presentation

VALUE ENGINEERING JOB PLAN

- Value-based decision process
- Uses functional approach
- Follows a very structured, systematic and organized plan
- Focus towards optimal possible solution based on creativity techniques



SIX SIGMA

A methodology that establishes a correlation between:

- Function (CTQs) Performance and Capability
- The number of product defects
- Wasted operational costs
- The level of customer satisfaction

$$Value = \sum_{i}^{n} \left[\sum_{k}^{m} \left(\frac{(Performance)_m}{\sum_{l=1}^{n} (Cost_{Performance})_l} + \frac{(Capability)_m}{\sum_{l=1}^{n} (Cost_{Capability})_l} \right) \right]$$

$i = number \quad of \quad Functions$

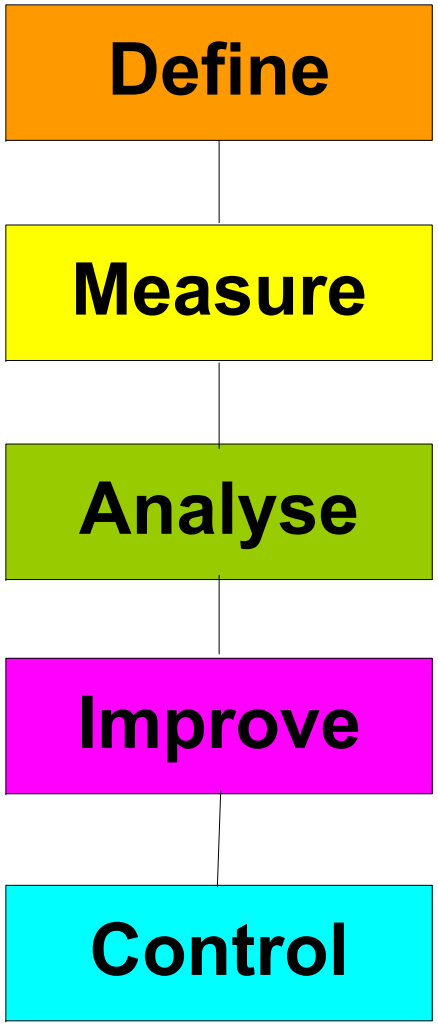
$j = elements \quad of \quad the \quad Cost \quad associated \quad with \quad each \quad of \quad the \quad Functions$

$k = number \quad of \quad CTQs \quad for \quad each \quad of \quad the \quad Functions$

$l = elements \quad of \quad the \quad Cost \quad associated \quad with \quad each \quad of \quad the \quad CTQs$

SIX SIGMA JOB PLAN

- Value-based decision process
- Uses quality (variation reduction) approach
- Follows a very structured, systematic and organized plan
- Focus towards optimal possible solution based on statistical techniques

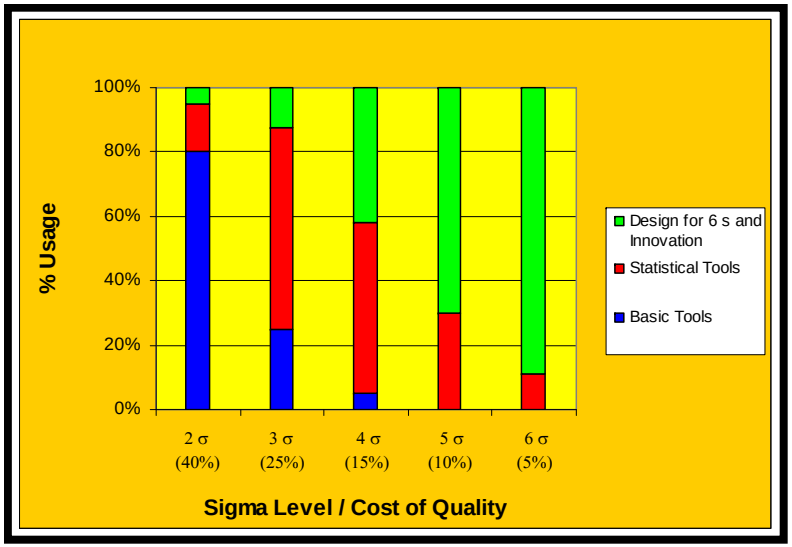


VALUE CREATION STRATEGY

- Value Creation Strategy
  - Implement improved / optimized functions, performance and capability
  - Reduce the cost
  - Combination of improved / optimized functions, performance, capability and reduced cost
- Value Retention Strategy
  - Retain created knowledge
  - Reuse knowledge

VALUE CREATION SYSTEM

In order to successfully manage value creation and retention organizations must create and manage project portfolio and associated organizational execution capability that will constantly optimize all value creation and retention system.



$$Value = \sum_{i=1}^{n} \frac{(Function)_i}{\sum_{j=1}^{g} (Cost)_j} = \sum_{i=1}^{n} \frac{(Function)_i}{\sum_{j=1}^{g} (Cost)_j} + \sum_{i}^{n} \left[\sum_{k}^{m} \left(\frac{(Performance)_m}{\sum_{l=1}^{n} (Cost_{Performance})_l} + \frac{(Capability)_m}{\sum_{l=1}^{n} (Cost_{Capability})_l} \right) \right]$$

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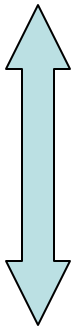
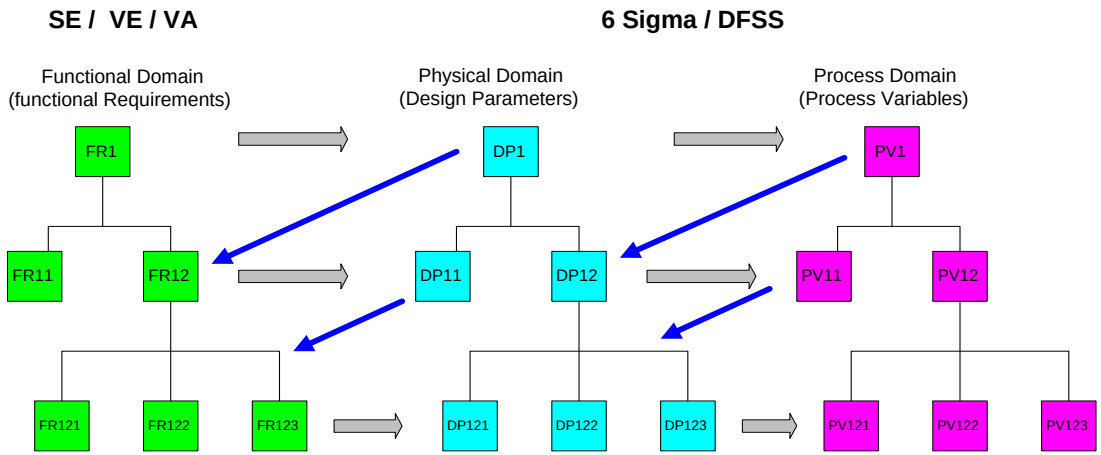
VALUE CREATION ROADMAP

- Market requirements
- Customer requirements
- System Design
- Subsystem Design
- Component Design
- Process Design

- Real World Problem
- Functional Domain
- Functional Solution
- Statistical Domain
- Statistical Solution
- Real World Solution

CTQ and Transfer Function Flow





INTEGRATED JOB PLAN

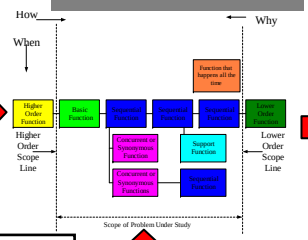
MARKET DOMAIN

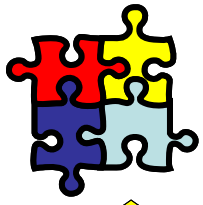
INFORMATION PHASE

FUNCTION PHASE

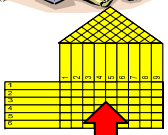
CREATIVE PHASE

EVALUATION AND DEVELOPMENT PHASE

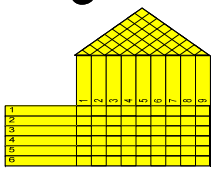




ASSESSMENT CARD



QFD



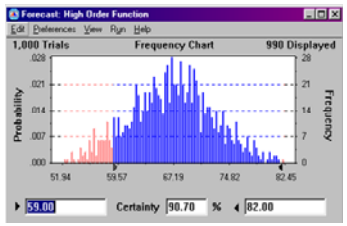
System Design

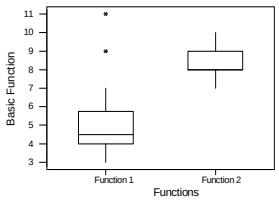
Subsytem Design

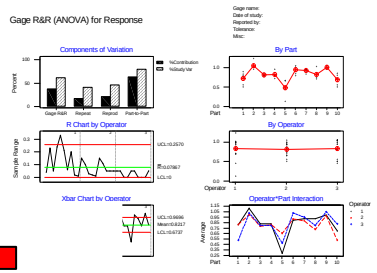
ANALYZE IMPROVE/DESIGN OPTIMIZE

MEASURE

Component Design

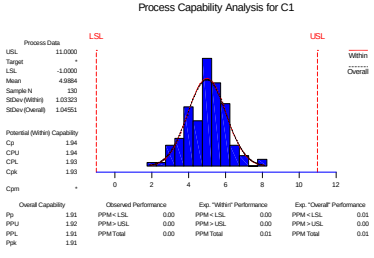


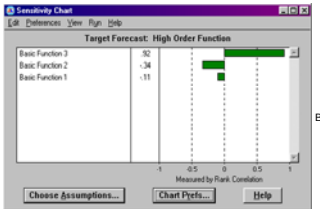


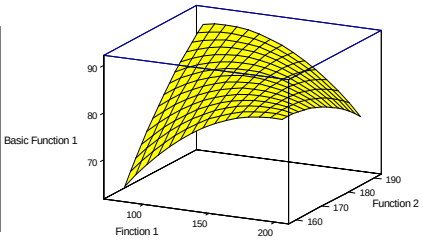


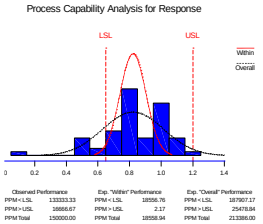
Process design

CONTROL/VALIDATE

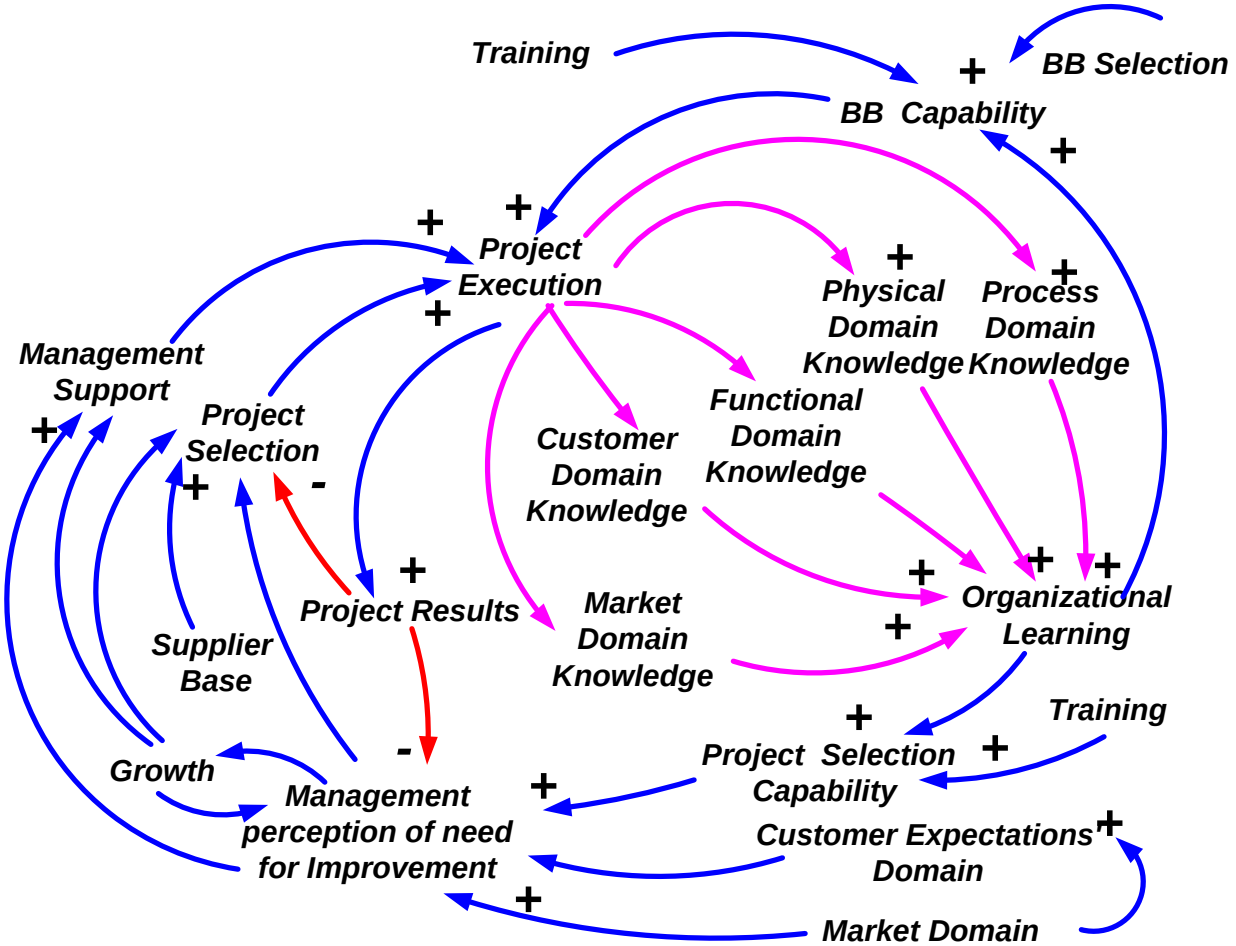








GROWTH MODEL



FINAL THOUGHTS

- Lean Six Sigma and Value Engineering synergy is powerful methodology that harnesses existing organizational creativity and knowledge resulting in superior innovative products and processes with unique customer benefits
- Increases customer value by optimizing costs, quality and delivery
- Dramatically reduces time to market execution